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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,967	06/27/2003	William M. Radich	S104.12-0037/STL 11305	3060

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EXAMINER	
CHAUDRY, MUJTABA M	

ART UNIT	PAPER NUMBER
2112	

MAIL DATE	DELIVERY MODE
08/30/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/607,967	RADICH, WILLIAM M.	
	Examiner	Art Unit	
	M. MUJTABA K. CHAUDRY	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-18 and 20-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-18 and 20-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's response filed 07/09/2010 is considered.

- Claims 9 and 19 were cancelled.
- Claims 21 and 22 were added.
- Claims 1, 11 and 20 were amended.
- Claims 1-8, 10-18 and 20-22 are pending and are rejected.

Application is pending.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 07/09/2010 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-8, 10-18 and 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The independent claims recite: developing a statistical model having a transition jitter variable that relates transition jitter, which depends upon positions of data transitions on a medium.

- It is not clear exactly what the Applicant wishes to convey in this limitation.
- The process of *developing* is not clear. It is not certain if this takes place in the detector during decoding or if the model is developed prior to detector operating.
- Also, what is meant by "relates" to transition jitter.
- Essential elements are missing from the claims.

Appropriate corrections are requested. Dependent claims are rejected based on dependency.

Claim Rejections - 35 USC § 102

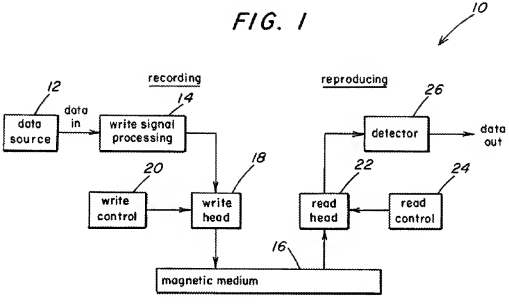
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 7, 8, 11, 12, 17, 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kavcic et al. (USPN 6438180).

As per claim 1, Kavcic et al. (herein after referred to as one entity: Kavcic) teaches (abstract and Figure 1) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values. The Examiner would like to point out that Kavcic teaches (i.e., col. 11, line 47—col. 12, line 23) a statistic model with transition jitter variable (i.e., Table 1, col. 12).

FIG. 1



As per claim 2, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at

high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 7 and 8, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 11, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values. The Examiner would like to point out that Kavcic teaches (i.e., col. 11, line 47—col. 12, line 23) a statistic model with transition jitter variable (i.e., Table 1, col. 12).

As per claim 12, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD)

without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 17 and 18, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 20, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values. The Examiner would like to point out that Kavcic teaches (i.e., col. 11, line 47—col. 12, line 23) a statistic model with transition jitter variable (i.e., Table 1, col. 12).

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3-6, 10, 13-16 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kavcic et al. (USPN 6438180).

As per claims 3-6, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

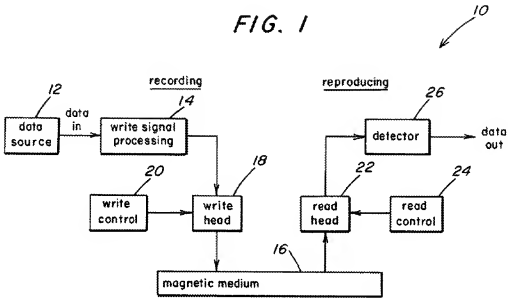
Kavcic does not explicitly teach to calculate branch metric values using the various functions as stated in the present application.

However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the

art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

As per claim 10, Kavcic substantially teaches (Figure 1) the detector to be part of the read channel and is post processor.

FIG. 1



As per claims 13-16, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the

detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

Kavcic does not explicitly teach to calculate branch metric values using the various functions as stated in the present application.

However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

As per claims 21-22, Kavcic does not explicitly teach the statistical model to be based on a Taylor series model. However, the Examiner would like to point out that a Taylor series model is well-known in the art to be used for transition jitter (i.e., see Whitsitt, USPN 5805742 and Li et al. USPN 6031880). These references are only for examples. Therefore it would have been an obvious engineering design choice to use a Taylor series model for transition jitter.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Additional references have been cited for Applicant's review.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. MUJTABA K. CHAUDRY whose telephone number is (571)272-3817. The examiner can normally be reached on Mon-Fri 9-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on 571-272-3644. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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